THE ZX SPECTRUM SYSTEM TEST ROM CARTRIDGE.

A. Instructions for operation.

For a rapid test of the operation of the ZX Spectrum, carry out the following steps (If more time is available see section 14 first).

1. Demonstrate the "c 1982 Sinclair Reseach Ltd" message by connecting up a ZX Spectrum and a television set as described in the booklet - SINCLAIR ZX SPECTRUM INTRODUCTION. If this succeeds, go on to stage 2.

   If the copyright message is unobtainable, the fault may be in the ZX Spectrum under test. But, before assuming this, it is best to test the Power Supply Unit and the Television by replacing the 'faulty' ZX Spectrum one that is known to be in working order and showing that it still works.

   A ZX Spectrum that fails to give the copyright message is faulty and should be returned for repair.

2. DISCONNECT the power lead.

3. Push the System Test ROM Cartridge firmly into a ZX Interface 2 unit.

4. Connect the ZX Interface 2 to the ZX Spectrum peripheral port.

5. Reconnect the power lead.

The screen should now display the SYSTEM TEST ROM CARTRIDGE title and a menu.

IMPORTANT NOTE. If at any point during these tests the system fails to respond any further to the keyboard, or it returns to the main menu unexpectedly, then it should be considered to have failed.

6. Press the "R" key to select the Full test option.

7. The screen will display ZX SPECTRUM KEYBOARD TEST. Press each key until they are all covered by red squares on the screen. If this is not possible then the ZX Spectrum has failed, otherwise press CAPS SHIFT and BREAK together to go on.

8. The screen will display BORDER test. The border area will alternate between narrow Blue and Yellow stripes going on for about three seconds, and steady Blue for about one second. Allow this to continue for at least ten seconds, then press CAPS SHIFT and BREAK to go on. If any of the above patterns are not observed, or the keyboard will not respond, then the ZX Spectrum has failed.

9. The screen will now display SOUND TEST. If the speaker can be heard playing a scale then press CAPS SHIFT and BREAK to go on. Otherwise it has failed.

10. The next test is the COLOUR TEST. The screen will display all eight colours in normal and extra brightness, with their names. Check these correspond, and press CAPS SHIFT and BREAK to pass on. Otherwise fail.

11. The FLASH TEST flashes the whole screen, except the border, between black and white. Check this, and press CAPS SHIFT and BREAK to pass on if it is OK.

12. The RAM TEST checks all of memory with a variety of patterns. Press any key to start it. It will report either that the machine has 16K or 48K of memory in working order, or that a memory location is faulty. If it reports the machine size to be that which you expect, then pass on with CAPS SHIFT and BREAK. Otherwise fail.

This completes a full test. If a cassette recorder is available then the cassette test should also be carried out.

13. The CASSETTE TEST is Option 8 on the menu. It is in two parts. First a tone is recorded onto tape. To do this connect the MIC socket of the ZX Spectrum to the microphone input of the tape recorder (do not connect the EAR sockets). Position a blank cassette past its leader (the plastic part of tape at the start which does not record) and press record. Press S on the ZX Spectrum. A 5 second test tone will be recorded. You may listen to this on the cassette to check it; it will be a clear steady high-pitched tone, lasting five seconds. This constitutes a test of the computers ability to SAVE.

To test its ability to LOAD, position the tape you have just recorded back to its start (or use the start of any ZX Spectrum program on cassette), connect the EAR socket of the ZX Spectrum to the earphone output of the cassette recorder, set the volume to about three quarters of its maximum level, and press J on the ZX Spectrum then Play on the tape recorder. The border should show a brief period of red and cyan stripes, and the message LOADING OK should appear at the bottom of the screen If this does not occur, rewind the tape and try repeating the process and vary the volume setting each time.

If both these tests are successful then press CAPS SHIFT and BREAK to return to the main menu. Otherwise the ZX Spectrum has failed.

The Full Test and the Cassette Test constitute a complete test of the system's operation. Further tests detailed below may be carried out if it is required to test peripherals, or the ZX Spectrum is suspected of failure after it has been switched on for a while.

14. Soak Test.
If sufficient time is available, or the ZX Spectrum is suspected of failing when hot or after some time, then the sequence of test described above should be done after a SOAK TEST.

To do this follow the steps above to stage 6, then select Option 7 on the menu and then press any key to start the test. This will run for about an hour, and all the time a red square will move from the top to the bottom of the screen. If this should stop. or an error be reported, then fail the system. Otherwise carry on with the test above from Stage 7.

These tests test peripherals to the Spectrum.

15. ZX Printer Test.
To test a ZX Printer, connec it to the rear of the Interface 2 WHILE THE POWER IS OFF, with everything set up as above. Power up, and press key 9 to select ZX Printer test. Press Z to COPY the screen to the printer. This should all be reasonably clear and legible.

16. RS 232 test.
This requires the ZX Interface 1 also to be attached, and a device capable of sending and/or receiving at 9600 baud. A suitable device to test output would be a printer capable of receiving at 9600 baud, or another ZX Spectrum and ZX Interface 1 connected by a "crossover" lead could be used to test both input and output. Suitable programs for it are:

To test output from the Spectrum under test:

```
10 OPEN #4, "t"
20 LET a$=INKEY$ #4
30 IF a$="" OR a$=CHR$ 10 THEN GO TO 30
40 PRINT a$;
50 GO TO 20
```

To test input from the Spectrum under test:

```
10 OPEN #4,"t"
20 FOR a=97 TO 122
30 PRINT #4;CHR$ a;
40 NEXT a
50 GO TO 20
```

16. Network test.
This requires a second Spectrum equipped with a ZX Interface 1, connected to the system under test via a network lead as per the ZX Microdrive and ZX Interface 1 manual. Q is pressed to select Network test. To test network sending, enter and RUN the following program on the other Spectrum, and then press P.

```
10 FORMAT "n";2
20 OPEN #4;"n";1
30 PRINT INKEY$ #4;
```

```
40 GO TO 30
```

The letters of the alphabet should appear on the screen, and the report "End of file" should be produced.

To test network receiving, enter and RUN the following program on the other ZX Spectrum, and press 1.

```
10 FORMAT "n";2
20 OPEN #4;"n";1
30 FOR a=97 TO 122
40 PRINT #4;CHR$ a;
50 NEXT a
60 CLOSE #4
70 GO TO 20
```

17. Joystick test.
Connect a joystick to each socket in turn, and move it in each direction, including the diagonals. Also press the fire button. This should produce nine red blocks in each square.

B. Notes on Failure.

If a ZX Spectrum has failed one or more of the above tests, it should be sent for repair as appropriate, with an indication of how it failed.

This section is intended as a guide to what might cause failure at each section of the test. It should only be used by persons qualified to repair the computer.

1. The Keyboard test.

If the keys fail in rows or columns then it is likely that the keyboard tails are at fault.

2. The Border Test.

This test loads a routine into the 16K video RAM that executes a tight loop involving I/O. This simulates the effect of an arcade game in the video RAM. This has been known to cause Spectrums to crash.

Failure will result in the computer crashing, identified either by it stopping and not responding to the keyboard, or by the display returning to the main menu.

3. The Sound Test.

This tests the loudspeaker by playing a scale of notes. If no sound can be heard, then the speaker or the circuit driving it has failed.

4. The Colour Test.

If the display is in Black and White, or the colours are not as described, then the computer should be sent for repair. The distinction between normal and bright is only apparent

in the brighter colours, usually from green to white.

5. The Flash Test.

Flashes the whole screen between black and white, except the border. If part or all of the screen is not flashing then the ULA is almost certainly at fault.

6. The RAM Test.

The RAM Test tests every location with a variey of patterns. If it fails to detect that the machine has 16K or 48K of RAM, i.e. there is some other amount, then it will report the first location that failed, indicating what happens when that location is loaded with 00 and FF. This will be of diagnostic use in the case of a stuck bit; if there is an addressing fault then these may appear correct.

7. The Soak Test.

Failure here may indicate that the RAM refresh is not functioning properly - test blocks are maintained in both areas of RAM, and corruptions are reported. It could also indicate a timing failure when the computer is hot.

8. The Cassette Test.

This tests the electrical and mechanical integrity of the cassette interface circuitry. In the Output test a five second tone, similar to the leader on Saved programs, is sent to the Mic port. This should be recorded onto a cassette. The Input test will look for a leader, either that recorded by the output test, or one from an ordinary recorded program. The detection appears in the normal way, i.e. the Border shows a brief period of cyan and red stripes.

9. The ZX Printer Test.

Performs a normal COPY operation on a screen full of text. Failure will be when the text is misprinted or faint.

0. The RS232 Test.

Self explanatory. Check the connections are correct; the "crossover" lead mentioned when connecting two Spectrums crosses over TXData and RXData, and crosses CTS and DTR.

Q. The Network Test.

Self explanatory. Again, check the connections. The mini-jack sockets should be checked.

W. The Joystick Test.

This is equivalent to reading the top row of keys. Check the ZX Interface 2 electronics and the joystick connectors if it fails.